REMARKS

Reconsideration of this application is respectfully requested.

In accordance with the requirements of standard USPTO practice, the undersigned initially makes of record a telephone conversation between the Examiner and the undersigned's partner Jeffry H. Nelson on or about June 26, 2000. At that time, the Examiner indicated that this application would be considered allowable if claim 14 were cancelled, claim 15 rewritten into independent form (or cancelled) and claim 1 was amended to include the limitation from dependent claim 2 requiring the waveform to comprise "voice speech". This proposal was not timely accepted by the applicant and therefore the outstanding final office action was issued.

It will be noted that the above amendment does cancel claim 14 and does limit claim 1 such that the waveform must comprise "cyclical sound" (e.g., thus covering both voiced speech synthesis and music synthesis). Claim 15 of course depends from claim 1 so it does not need to be written into independent form or cancelled if claim 1 is considered allowable.

The rejection of claims 1, 3-11 and 15 under 35 U.S.C. §102 as allegedly anticipated by Mindlin et al is respectfully traversed.

The Examiner's original objection against claim 1 alleged that the "embedding" section of Mindlin's paper anticipated features (b) to (d) of claim 1. The remarks in the subsequent final Office Action rely on a different section of the paper. Nevertheless, in item 6, the Examiner repeats the object raised in the first Office Action. With respect, the Examiner is believed to be erroneous in both regards.

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There are several ways of representing the dynamics of a dynamical system (e.g., a pendulum). One way would be to simply show a film of the system in action. Another is to draw a graph having the angular displacement of the pendulum from the vertical on one axis and time elapsed on the other axis. That results in a graph of sinusoidal shape. A third way is to draw a graph having the angular displacement on one axis and the velocity of the pendulum on another. In this representation, as the pendulum settles into a swinging motion, the points on the graph move towards and then follow a circle on that graph. This last representation is said to be in "state (or phase) space", the points on the graph form an "orbit", and the circle itself is known as an "attractor". Physicists have found that although a motion might look random when represented in either of the first two ways, it might nevertheless appear ordered when represented in the third way. Representations of the third type are seen in Figures 5(a), 6 and 7 of the Mindlin reference.

Mindlin teaches a method of analyzing a dynamical system to obtain a topological description of the dynamics of that system. Topology is the branch of mathematics that describes knots and such. A reef-knot has the same topology whether it is tied in a piece of cotton or in a two-inch diameter rope. Hence, a topological analysis of the two would yield the same result.

"Embedding" simply refers to the representation in state space of data gathered from a dynamical system. As can be seen from two paragraphs above, the process of "embedding" can reveal patterns in the data that cannot easily be seen in other representations of the data. The Examiner will see that the "orbits" gathered from the data being analyzed in the Mindlin paper

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look a little like knots when represented in state space (Figures 7(a) and 7(b)). Indeed, by embedding data in state space, Mindlin is able to deduce topological parameters which characterize the shape of orbits representing that data in state space.

It is important that the Examiner understands that nothing that can be described as a "waveform" is generated in the "Embedding" section of Mindlin's paper. If the Examiner wishes to maintain that a waveform is generated there, then applicant asks that the Examiner identify what in that section is alleged to be a waveform. In any case, there is no suggestion that any data generated in the "Embedding" section of Mindlin should subsequently be output.

In the current "final" action remarks, the Examiner appears to suggest that Mindlin teaches the generation of a waveform when he suggests applying a Hilbert transform to the data gathered from the Belousov-Zhabotinsky chemical reaction (in section 5 of his paper, Mindlin does this in order to make the analysis of that data easier). That process does produce data that may be represented as a waveform, but i) a Hilbert transform does not proceed iteratively as required by applicant's claim 1, and ii) Mindlin does not suggest that the data resulting from the transform are output (as required by feature (e) of applicant's claim).

The Examiner has not indicated where the nouns of applicant's method claim are to be found in the prior art. In particular, he has not pointed to data which can be described as a "waveform" or data which can be described as "data defining a transformation followed by said cycles".

Since Mindlin does not teach the generation of any waveform in the way recited in claim 1, even if a skilled person where to apply Mindlin to cyclical sound data, he or she would not be led to follow a method falling within the wording of claim 1.

The rejections of claim 14 have been mooted by its cancellation above without prejudice or disclaimer. Accordingly, no further comment is believed necessary with respect to Hirokawa or Kitoh.

The rejection of claim 2 under 35 U.S.C. §103 as allegedly being made "obvious" based on Mindlin taken alone is also respectfully traversed.

For reasons already noted above, it is clearly not "obvious" for one of only ordinary skill in the art to take the generalized Mindlin teaching and apply it to the synthesis of voiced speech waveforms as required by claim 2. Indeed, the Examiner's telephone offer on or about June 26 recognizes that such is not suggested by the Mindlin reference. In addition, Mindlin has all of the fundamental deficiencies already noted above with respect to parent claim 1.

The Examiner's attention is drawn to new independent method claim 16. This claim has been drawn specifically to applicant's method for generating synthetic voiced speech waveforms. In particular, it requires in step (a) what might be referred to as "embedding" in the cited Mindlin et al paper. That is, 16(a) requires data to be stored defining n-dimensional state space representations of voiced speech signals, n being an integer equal or greater than 3, in which successive voiced speech pitch pulse cycles are superimposed to provide a model of voiced speech dynamics.

It will be noted that the Mindlin paper has nothing whatever to do with voiced speech -- or, indeed, with sound synthesis of any kind whatsoever. At best, this is a general treatment of the ability to model chaotic cyclic systems within n-dimensional state space representations. The particular system being treated by Mindlin has to do with the dynamics of certain types of lasers. The analysis of such state space representations in Mindlin section 5 (i.e., deriving relative rotation rates and linking numbers) has only to do with analysis of the topology of the state space representations. Mindlin et al clearly do not contemplate synthesizing the output of a laser or the like by using the n-dimensional state space representation and going "backwards" into the time domain or the like. Instead, Mindlin et al strictly teach an analysis tool for better understanding the dynamical properties of the system being analyzed. There is no suggestion whatsoever that the stored analysis data in state space might be used to synthesize an output signal in substitution for the dynamical system being analyzed!

Certainly, there is no conceivable suggestion anywhere in Mindlin of claim 16 items (b), (c), (d) and (e). It will be noted, for example, that item (b) selects a synthesized waveform starting point in state space for a predetermined voiced speech waveform that is offset from the stored data. 16(c) then selects successive further synthesized waveform points in state space that are also respectively offset from the stored data in dependence jointly upon the preceding point in the synthesized sequence, nearest other stored points in the state sequence space and an offset vector therefrom. 16(d) repeats the processes of (b) and (c) for plural voiced speech pitch cycles and 16(e) outputs the resulting sequence of thus synthesized waveform points to generate a voiced speech waveform. There clearly is no possible teaching or suggestion of any such methodology in the Mindlin et al reference -- or any other of the cited prior art.

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Accordingly, this entire application is now believed to be in allowable condition and a

formal Notice to that effect is respectfully solicited.

Respectfully submitted,

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